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CLAIMS

1. A surface treatment agent comprising a fluoropolymer which has repeating units derived from a fluorine-containing monomer of the formula:

$$\begin{array}{ccc}
O & X \\
C & -C \\
C & -C \\
\end{array}$$
(I)

wherein X is a fluorine atom, a chlorine atom, a bromine atom, an iodine atom, a CFX¹X² group (in which X¹ and X² are each a hydrogen atom, a fluorine atom, a chlorine atom, a bromine atom or an iodine atom), a cyano group, a linear or branched fluoroalkyl group having 1 to 21 carbon atoms, a substituted or unsubstituted benzyl group, or a substituted or unsubstituted phenyl group;

Y is an aliphatic group having 1 to 10 carbon atoms, an aromatic or cycloaliphatic group having 6 to 10 carbon atoms, a -CH₂CH₂N(R¹)SO₂- group (in which R¹ is an alkyl group having 1 to 4 carbon atoms) or a -CH₂CH(OY¹)CH₂- group (in which Y¹ is a hydrogen atom or an acetyl group); and Rf is a linear or branched fluoroalkyl or fluroalkenyl group having 1 to 21 carbon atoms, or a fluoroether group having totally 1 to 200 repeating units selected from the group consisting of the repeating units: -C₃F₆O-, -C₂F₄O-

and $-CF_2O-$, and

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wherein (a) the fluoropolymer contains a silicon atom, and/or (b) the surface treatment agent comprises the fluoropolymer (a first polymer) and a second polymer different from the first polymer, the second polymer being a silicon-containing polymer which contains a silicon atom.

- 2. The surface treatment agent according to claim 1, wherein the silicon-containing fluoropolymer comprises a fluorine-containing monomer and a silicon-containing monomer.
 - 3. The surface treatment agent according to claim 2, wherein the silicon-containing monomer is represented by the formula:

$$A - C - CH_2$$
 (II)

wherein A is a monovalent group having at least one silicon atom, and R^1 is a hydrogen atom or a methyl group.

4. The surface treatment agent according to claim 3, wherein the A group in the formula (II) is represented by the formula:

Rsi-X-

wherein Rsi is

 R^{1} -(Si(R^{12})₂)_p -, or

 R^{i-1} - $(Si(R^{i-2})_2$ - $O)_p$ -

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(in which the R^{11} group is a hydrogen atom, or a C_1 - C_8 alkyl group or a C_6 - C_6 aryl group; the R^{12} groups may be the same or different, each of which is a hydrogen atom, a C_1 - C_8 hydrocarbon or halogenated hydrocarbon group optionally having a functional group; and p is a number of 1 to 100); and

X is a direct bond, $-(CH_2)_q$ - (in which q is a number of 1 to 20), $-(CH_2)_r$ -O- (in which r is a number of 0 to 20), or $-(CH_2)_s$ -OC(=O)- (in which s is a number of 0 to 20).

- 5. The surface treatment agent according to claim 2, wherein the silicon-containing fluoropolymer contains a fluorine-free and silicon-free monomer in addition to the fluorine-containing monomer and the silicon-containing monomer.
- 6. The surface treatment agent according to claim 5,
 wherein, in the silicon-containing fluoropolymer, the
 amount of the silicon-containing monomer is from 0.01 to 50
 parts by weight, and the amount of the fluorine-free and
 silicon-free monomer is 50 or less parts by weight, based
 on 100 parts by weight of the fluorine-containing monomer.

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7. The surface treatment agent according to claim 1, wherein the silicon-containing polymer as the second polymer different from the fluoropolymer is a siloxane polymer.

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8. The surface treatment agent according to claim 7, wherein the siloxane polymer is a compound of the formula:

wherein the R^{21} and R^{23} groups are each a hydrogen atom, a C_1 - C_8 hydrocarbon group (e.g., a C_1 - C_8 alkyl group or a C_6 - C_8 aryl group) or a functional group-containing group; the R^{22} groups may be the same or different, each of which is a hydrogen atom, a C_1 - C_8 hydrocarbon group, a C_1 - C_8 halogenated hydrocarbon group, or a functional group-containing group; and t is a number of 1 to 200.

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9. The surface treatment agent according to claim 1, wherein the amount of the silicon-containing polymer as the second polymer is 0.01 to 50 parts by weight, per 100 parts by weight of the fluoropolymer.

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10. The surface treatment agent according to claim 1,

wherein the Rf group is a fluoroalkyl or fluoroalkenyl group having 1 to 6 carbon atoms.

- 11. The surface treatment agent according to claim 1,
 5 which is in the form of a solution, an emulsion or an aerosol.
- 12. A silicon-containing fluoropolymer comprising:(A) repeating units derived from a fluorine-containingmonomer of the formula:

$$Rf-Y-O-C-C-C=CH_2 \qquad \qquad (I)$$

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wherein X is a fluorine atom, a chlorine atom, a bromine atom, an iodine atom, a CFX¹X² group (in which X¹ and X² are each a hydrogen atom, a fluorine atom, a chlorine atom, a bromine atom or an iodine atom), a cyano group, a linear or branched fluoroalkyl group having 1 to 21 carbon atoms, a substituted or unsubstituted benzyl group, or a substituted or unsubstituted phenyl group;

Y is an alkylene group having 1 to 3 carbon atoms or a $-CH_2CH(OY^1)CH_2-$ group (in which Y^1 is a hydrogen atom or an acetyl group); and

Rf is a linear or branched fluoroalkyl or fluroalkenyl group having 1 to 21 carbon atoms, or a fluoroether group having 1 to 200 repeating unit selected from the group

consisting of the repeating units: $-C_3F_6O^-$, $-C_2F_4O^-$ and $-CF_2O^-$; and

(B) repeating units derived from a silicon-containing monomer.

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13. The polymer according to claim 12, wherein the silicon-containing fluoropolymer contains a fluorine-free and silicon-free monomer in addition to the fluorine-containing monomer and the silicon-containing monomer.

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- 14. A method for treating a substrate with the surface treatment agent according to any one of claims 1 to 11.
- 15. A textile treated with the surface treatment agent according to any one of claims 1 to 11.
 - 16. A carpet treated with the surface treatment agent according to any one of claims 1 to 11.